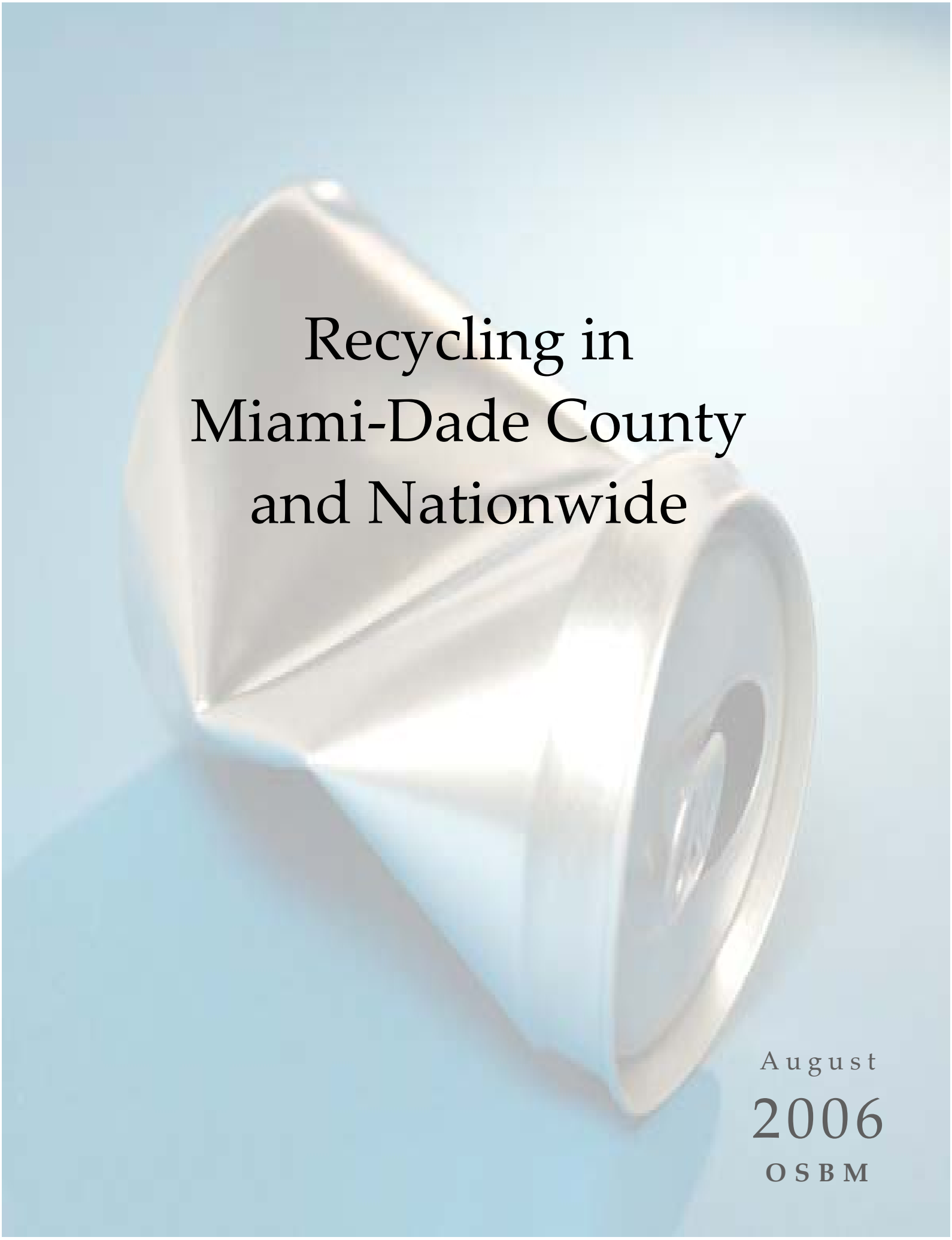

# Recycling in Miami-Dade County and Nationwide

August

2006

OSBM

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## PROLOGUE

Miami-Dade County's Department of Solid Waste Management currently provides over 300,000 households with curbside recycling services. Every week, residents can set out materials including paper, metals, plastics and glass in two colored bins for pick-up by a private vendor. Over the years, it has become apparent that the program, as currently structured, is under-productive and costly to operate. Total tons collected per household are low in comparison to other jurisdictions and in decline, and operating costs per household and per ton are above national averages. Faced with an expiring contract and a multitude of operational challenges, the County is currently seeking a new approach to recycling that will result in a higher Countywide recycling rate and greater cost effectiveness.

The attached report, prepared by the Office of Strategic Business Management (OSBM), is intended to facilitate a broad discussion of recycling in the community, as well as the County's particular role. In preparing the report, OSBM drew from a wide range of information sources, including national, state, and local legislation, relevant literature and web sites, interviews with Department of Solid Waste Management staff and visits to County-owned disposal facilities. OSBM also researched community recycling programs across the country through interviews with comparative jurisdictions. A summary of information sources is provided in Attachment 1.



## EXECUTIVE SUMMARY

Despite a level of debate over its efficacy, recycling is clearly embedded in federal and state legislation. In Florida, all counties are accountable for a minimum countywide recycling goal of 30%, and are required to implement a recyclable materials program.

Although recycling is most commonly associated with residential curbside collection programs, curbside is but one of many forms of recycling. Others include:

- collection at multi-family residences;
- collection at commercial establishments;
- industrial recycling;
- conversion of yard trash into clean burning fuel;
- recovery of metals at waste-to-energy plants;
- collection of used electronics and appliances at central drop-off sites;
- composting of garbage (food waste) and/or yard trash; and
- mulching of clean yard trash.

Approximately 709,000 tons of waste is recycled annually within Miami-Dade County's borders through a combination of such activities. Curbside recycling provided by the County's Department of Solid Waste Management (DSWM) currently generates a relatively small five percent of this total, and represents less than one percent of municipal solid waste produced in Miami-Dade County.

Specific recycling methods vary considerably across communities, depending on particular local circumstances including, for example, solid waste disposal capacity, the extent of community commitment to recycling, space, size and nature of local collection and processing facilities, local markets for recycled products and availability of funding. On the national level, *there is no single preferred model for community recycling,* though 33 of the nation's 35 largest cities do offer curbside recycling services.

Research has indicated that *although curbside collection can be an important element of a community's integrated recycling strategy, jurisdictions with the highest overall recycling rates tend to employ a multi-pronged approach* that includes attention to the most productive methods. Specifically, communities tend to incorporate one or more of the following strategies to increase the overall recycling rate:

- a vibrant commercial recycling industry, cultivated when needed by local government efforts;
- effective community-wide programs designed to promote recycling, including enforcement of local mandates and educational programs;
- a well-designed and adequately promoted residential curbside recycling program;



- ❖ an easy-to-use drop-off program for residents and/or industry, often utilizing partnerships with community groups and non-profits, high-density locations, and parks and events;
- ❖ maximizing the processing of yard waste into clean burning fuel and/or mulch; and
- ❖ composting household garbage.

With this in mind, and in light of the expiring curbside collection contract, OSBM recommends reengaging with the recycling industry through a flexible approach, such as an "industry day," Request for Information, or a similarly interactive method. Vendors will be requested to provide solutions that increase the County's total recycling rate and program cost effectiveness and that are acceptable to residential customers.

The sections that follow provide a history of recycling in the United States and an overview of legislative mandates at the federal, state and local levels; present an overview of the County's overall waste stream and recycling activities; and summarize the experiences of other communities nationwide in both promoting recycling generally and directly operating recycling programs.

## RECYCLING HISTORY AND LEGISLATION

**Passed by Congress in the 1970s:**

- The Clean Air Act
- The Federal Water Pollution Control Act
- Coastal Zone Management Act
- Marine Mammal Protection Act
- Federal Insecticide, Fungicide, Rodenticide Act
- Toxic Substances Control Act
- Endangered Species Act
- Safe Drinking Water Act
- Hazardous Waste Transportation Act
- The Resources Conservation and Recovery Act
- Soil and Water Conservation Action
- Surface Mining and Reclamation Act
- National Energy Act
- Endangered American Wilderness Act
- Antarctic Conservation Act

For the past three decades, recycling has been a component of Americans' efforts to preserve their local and global environment.

The first major wave of recycling in the United States occurred during the two world wars, when material shortages led to major government-sponsored recycling campaigns. It was not until the 1970s, however, when the federal government formally established a national waste management policy and the mantra of "reduce, reuse, recycle" first entered the public consciousness, that recycling was conceptualized as a means of preserving the environment.

The federal policy was shaped during a decade of legislative environmental protection action, triggered by health and environmental concerns relating to unsafe hazardous waste disposal, air pollution, water pollution (sewage and chemical), unsafe toxic chemical usage by private industry and logging of old-growth forests, as well as a national energy crisis. Events of the 1960s, such

as Congressional hearings exposing the harmful effects of lead in gasoline, the Cuyahoga River in Ohio catching fire from oil and chemical pollution, and the 1970s Love Canal community built on top of a major toxic waste dump are a few well-known instances that spurred major protection efforts. As a result, Congress passed several acts that either directly or peripherally addressed environmental concerns.

The Resources Conservation and Recovery Act (RCRA), passed by Congress in 1976, sought to protect human health and the environment from hazards associated with waste disposal as well as to conserve valuable materials and energy resources. It established a national waste management policy, components of which included encouraged recycling, source reduction, and waste-to-energy facilities. RCRA established a Federal-State partnership to carry out its principles, requiring state planning for waste management to achieve its objectives. RCRA regulations, the general guidelines for waste management envisioned by Congress, are issued annually by the Environmental Protection Agency (EPA) and incorporated into Title 40 of the Code of Federal Regulations (CFR) Parts 239 to 299.

In 1987, images of the *Mobro 4000* garbage barge from Islip, Long Island made front page news. The barge sailed for weeks, carrying 3,100 tons of waste, and was repeatedly denied disposal by U.S. coastal cities, Mexico, and Belize. The floating garbage incident created the perception of a national landfill capacity crisis, and although it later surfaced that other factors[1] were responsible, it resulted in considerable public debate about the status of waste disposal capacity in the U.S.

The incident may also have helped spark an increase in community recycling efforts.[2] In 1988, approximately 1,000 local jurisdictions provided curbside recycling services to residents; this number grew rapidly throughout the 1990s and reached its apex in 2001, when almost 10,000 jurisdictions offered curbside to residents.[3] (By 2004, the number had fallen to 7,700.[4]) Presently, 33 of the country's 35 largest cities operate curbside programs.

Over the past thirty years, landfill capacity has steadily increased and the environmental movement has evolved to focus on a broader range of issues such as global warming and ozone depletion. Nonetheless, national recycling rates have increased, and recycling continues to be part of a legislated waste management strategy in most states.

*Florida Law*

National policy is reflected at the state level by Florida Statute 403.706, which requires each county to implement a recyclable materials program. It establishes a minimum waste reduction goal of 30%, interpreted by the Florida Department of Environmental Protection

[1] These included a failed business deal and the misperception that the barge carried hazardous medical waste.
[2] *What a Waste*, Federal Reserve Bank of Boston Regional Review, Q1 2002
[3] U.S. Enviornmental Protection Agency
[4] *The State of Garbage in America*, Biocycle Magazine, April 2006



(FDEP) as a recycling rate, and encourages county-municipal "cooperative arrangements" for executing this program.[5] To reach this 30% goal, the Statute specifically directs that:

- The program must be designed to recover a "significant portion" of at least four of the following eight materials for recycling: newspaper, aluminum cans, steel cans, glass, plastic bottles, cardboard, office paper, and yard trash. The term "significant portion" is interpreted by the FDEP as recycling more than 50% of the total amount of each designated material as present in the waste stream.[6]

- Metals can be recovered through technology employed by waste-to-energy facilities. (Miami-Dade County reclaims approximately 30,000 tons of metals per year in this manner.)

- A county may receive "credit towards one-half of the goal for waste reduction from the use of yard trash." (Miami-Dade County recycles approximately 178,000 tons of yard trash into a processed fuel known as biomass. The biomass is sold to fuel energy plants in Central Florida.)

Counties are required to annually report progress towards meeting the 30% goal, though the State has not undertaken aggressive enforcement.

*Local Legislation*

Chapter 15 of the Code of Miami-Dade County governs solid waste collection and recycling. It requires commercial and multi-residential establishments to recycle and residential units to recycle in accordance with the program in place. Specific provisions, which apply to both unincorporated areas and municipalities, include:

- Multi-residential units must recycle, at a minimum: newspaper, glass, aluminum cans, steel cans, and plastics. Every commercial establishment must recycle three out of the following ten materials: high-grade office paper, mixed paper, corrugated cardboard, glass, aluminum (cans, scrap), steel (cans, scrap), other metals/production materials, plastics, textiles, or wood.

- Both multi-residential units and commercial establishments must utilize the services of licensed haulers, unless (commercial only) a modified recycling program is submitted to and approved by the DSWM. Multi-residential, commercial and residential units are required to separate materials in accordance with the program provided at that location.

[5] Title XXIX, Chapter 403.706 FAC
[6] Approximated using a waste composition analysis



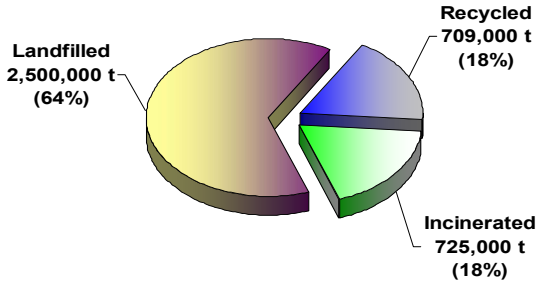
Enforcement responsibilities lie with the County Manager and are performed by the DSWM on a complaint basis. The County has elected to utilize warning letters as the preferred mechanism to achieve compliance and has only rarely issued citations in recent years.

## OVERVIEW OF MIAMI-DADE COUNTY MUNICIPAL WASTE STREAM AND DEPARTMENT OF SOLID WASTE MANAGEMENT

In 2004, Miami-Dade County's residents, businesses and industries generated approximately 3.9 million tons of annual solid waste. Of this amount, roughly 900,000 tons, or 23% of the total, was collected by the County's Department of Solid Waste Management. The remaining solid waste was either transported by a municipality or private hauler to a County-owned disposal facility (an additional approximate 900,000 tons) or disposed outside of the County (the remaining 2.1 million tons).

Solid Waste collected in Miami-Dade County is processed in one of three ways: it is landfilled, incinerated, or recycled. According to 2004 State of Florida Department of Environment Protection (DEP) data, of the 3.9 million tons of solid waste produced by the entire County, 64% is landfilled, 18% is incinerated, and 18% is recycled. (See Figure 1.)

**Figure 1**: Disposition of Municipal Solid Waste Produced in Miami-Dade County, 2004




**Miami-Dade County DSWM**

The Miami-Dade County Department of Solid Waste Management is the largest government owned and operated waste collection and disposal system in the southeastern United States. The primary responsibilities of the Department are the collection, transfer, disposal, and recycling of municipal solid waste. Currently, the Department provides waste collection, disposal, and recycling services to over 300,000 households including all the single-family residential units in unincorporated Miami-Dade County, as well as collection and recycling services to residential units in seven municipalities (Sunny Isles Beach, Cutler Bay, Doral, Miami Gardens, Miami Lakes, Palmetto Bay, and Pinecrest). Recycling services are provided via interlocal agreements to an additional thirteen municipalities. The Department also serves a small number of commercial and multi-family accounts in the unincorporated portions of the County, and allows for permitted private haulers and permitted landscapers to use the County disposal system for a fee.



The County's recycling rate is somewhat lower than the national and statewide averages. According to the *2006 State of Garbage in America* study, conducted by Biocycle Magazine and Columbia University's Earth Engineering Center, approximately 29% of the country's municipal solid waste was recycled in 2004, though state rates varied widely.[7] Florida's reported recycling rate was close to the national average at 24%[8]. Community recycling rates across the country vary similarly.

Of the 709,000 tons recycled countywide in 2004, just over a third can be attributed to the efforts of the DSWM; the balance can be attributed to municipal recycling programs and, most significantly, private sector recycling efforts (see Figure 2 below).

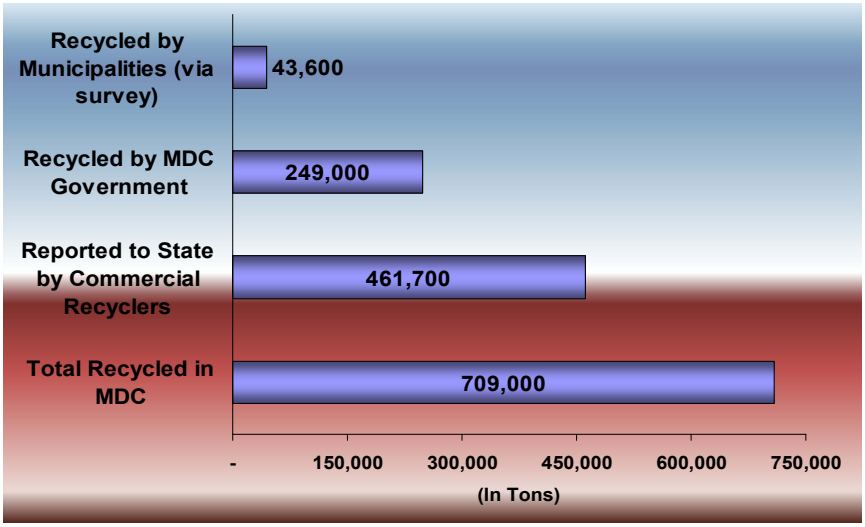



**Figure 2:**
Public and Private Recycling Activities Countywide, 2004*

**Note: there is some double-counting due to overlapping reporting methods*

Figure 3 on the following page provides a summary of recycling, its major sources, and its place in the overall County waste stream. Included is a breakdown of recycling through the County's DSWM, which takes place in one of four ways:

- the conversion of yard trash into clean burning fuel at the County's waste to energy (WTE) plant (71.5% of the County total);
- curbside recycling (14%);
- the extraction of metals from garbage at the WTE plant (12%); and
- the collection of white goods at neighborhood Trash and Recycling Centers (2.5%) .

The County's curbside recycling program is discussed in greater detail in the following section on community recycling programs nationwide; a summary of recycling and disposal activities at the waste to energy facility is provided below.

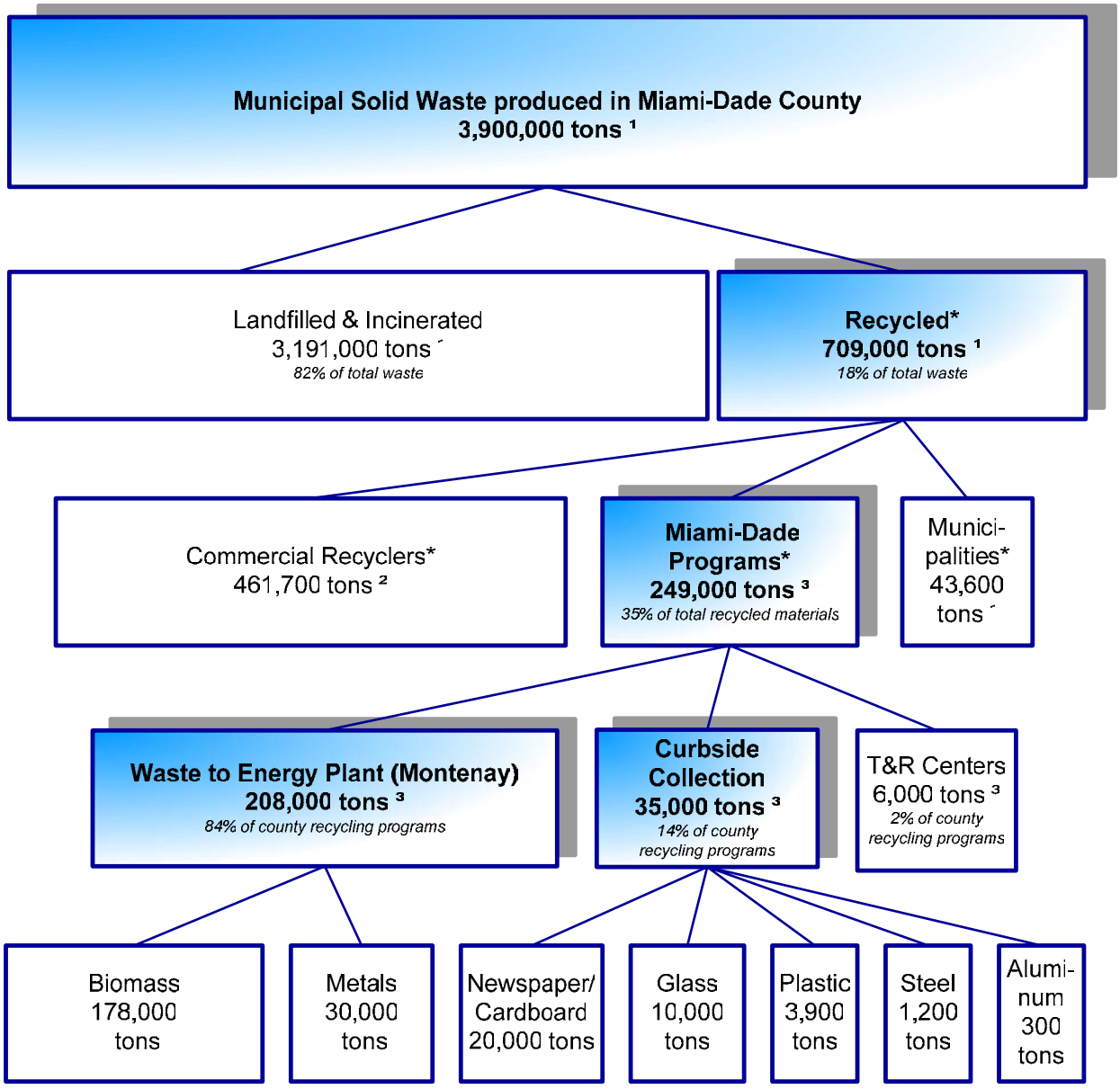
[7] *The State of Garbage in America*, Biocycle Magazine, April 2006

[8] Although the study in question attempted to standardize state comparisons, reported rates can be misleading, as states use different methods of calculating recycling rates and count different types of materials towards their goal.





**Figure 3:** Miami-Dade County Municipal Solid Waste Stream, 2004




*Materials recycled through the curbside collection program represent 5% of the total materials recycled and less than 1% of the municipal solid waste produced in Miami-Dade County*[4]

[1] DEP 2004 Municipal Solid Waste Report (calendar year)
[2] DEP 2004 Municipal Solid Waste Report (calendar year). Data reported by DEP Certified Recovered Commercial Material Dealers.
[3] FY 05 DSWM data (approximate)
[4] 3.9 million tons of waste is produced, 709,000 tons are recycled, 35,000 tons are collected through curbside recycling,

*Within the total amount of material recycled, 709,000 tons, there is some double-reporting of data (approximately 45K tons) reported by DEP Material Recovered Commercial Material Dealers, DSWM, and municipalities (conducting their own curbside programs).





*Resources Recovery Facility*

A key component of Miami-Dade County's integrated solid waste management system is the Resources Recovery Facility (RRF), owned by the County and operated under a management agreement with Montenay-Dade, Ltd., an affiliate of Montenay Power Corporation. The plant is the largest and most technologically sophisticated waste-to-energy facility in the world, capable of processing more than 1.2 million tons of trash and garbage annually. The plant is also where most of the recycling credited to the Miami-Dade Department of Solid Waste Management takes place.

The Facility has a Recyclable Trash Improvement (RTI) plant on site, where clean wood trash is shredded to produce a clean burning biomass fuel, the largest single component of DSWM's recycling program. Each year, the plant produces an estimated 178,000 tons of biomass fuel, which is then transferred and used by energy plants in central Florida.

To process garbage, which generally consists of kitchen and other household waste and affected trash, the facility utilizes waste to energy technology. The garbage is separated of non-combustibles and metal and converted into Refuse Derived Fuel (RDF). The RDF is then fed into four specially designed boilers and incinerated, producing energy and ash. The plant produces enough energy to power the plant, as well as a surplus amount (equivalent to what would be needed to provide energy to approximately 45,000 homes) that is fed into the FPL power grid and sold. Montenay and the County share the revenues from the energy production. Approximately 30,000 tons of metal per year is recovered at the facility (both pre- and post- incineration) and is handled by a private company under contract with Montenay.

Approximately 30% of garbage waste passes through the RRF and an additional 20% of total garbage is disposed of in County-owned landfills. This includes most non-combustibles (removed prior to garbage incineration or trash processing) and ash (the by-product of incineration), as well as garbage and trash in excess of plant capacity at any given time. Fines, or small non-combustible materials, are used as landfill cover.

Between the 178,000 tons of biomass fuel produced and the 30,000 tons of metal recovered, the Resource Recovery Facility is credited with recycling approximately 208,000 tons of waste annually.





## COMMUNITY RECYCLING PROGRAMS NATIONWIDE

Local governments promote recycling in a variety of ways. Generally speaking, these efforts fall within two broad categories:

- *Community-wide recycling promotion*: Most County governments are responsible for facilitating and promoting recycling among residents, businesses and community groups. In many states, including Florida, this role is statutorily prescribed.

- *Residential recycling programs*: Many cities, and counties that operate solid waste collection systems, directly operate residential recycling programs that provide for the collection, processing and sale of recyclable products. Of the thirty-five largest cities in the United States, thirty-three provide curbside recycling services to residents.

OSBM conducted research on both types of programs, studying county and city governments providing a wide range of services. We focused primarily on large cities and counties, Florida jurisdictions, and communities known for innovative or successful recycling programs.

Two important themes emerged in our research: (1) *there is no single preferred model for community recycling, and (2) although curbside collection can be an important element of a community's recycling strategy, jurisdictions with the highest overall recycling rates tend to employ a multi-pronged approach* that includes attention to the most productive methods.

Given these findings, OSBM recommends reengaging with the recycling industry through a flexible solicitation approach; this could include an "industry day," Request for Information, or another such collaborative method. Vendors would be requested to provide solutions that increase the County's total recycling rate and program cost effectiveness and that are acceptable to residential customers.

The following sections provide additional detail about communities' recycling promotion and residential recycling programs.

*Community-wide recycling promotion:*

Many states, including Florida, have instituted countywide recycling goals and have charged county governments with striving for these goals by promoting recycling across the community. Additionally, some counties have set broad, community-wide recycling goals through a countywide integrated waste management planning process. Success in this area is typically measured in terms of countywide recycling rates, defined as the percentage of the total municipal waste stream that is recycled. Rates can vary significantly depending on how "recycling" is defined; the consideration of yard waste is particularly critical.



An estimated 29% of the country's municipal solid waste was recycled in 2004.[9] State recycling rates ranged from a low of 1.6% in Mississippi to a high of 46% in Oregon; Florida's reported recycling rate was close to the national average at 24%. Community recycling rates across the country vary similarly: among the nation's largest 25 cities, reported community recycling rates ranged from 2% (Dallas) to 49% (Seattle) in 2003.[10]

In Florida, county recycling rates are periodically calculated by the Department of Environmental Protection (DEP) based on reports from the operators of recycling facilities. The DEP concluded that for calendar year 2002, Miami-Dade's overall recycling rate of 18% ranked 43rd out of 67 counties.[11] To identify recycling rates by material, reports from operators are compared to each county's waste composition estimates. These rates vary considerably by material; in general, counties have been most successful in recycling newspaper (38% of newspaper was recycled statewide in 2002), while experiencing greater challenges with plastic bottles (15%). It should be noted that waste composition analysis have not been updated by many counties in several years; possibly resulting in falsely high or low estimates of material quantities and impacting the reported recycling rates (see Figure 4).

**Figure 4**: Comparative Total Recycling Rates by Materials – Top Ten Florida Counties, Statewide and Nationwide

| County | Population Rank | Population [1] | MSW Recycling Rate (%) | Minimum 5 Materials Recycling Rates (%) [2] | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Newspapers | Glass | Aluminum Cans | Plastic Bottles | Steel Cans |
| **1. Dade** | **1** | **2,312,478** | **18** | **22** | **30** | **42** | **18** | **3** |
| 2. Broward | 2 | 1,669,153 | 23 | 42 | 19 | 15 | 14 | 28 |
| 3. Palm Beach | 3 | 1,183,197 | 36 | 59 | 37 | 44 | 10 | 93 |
| 4. Hillsborough | 4 | 1,055,617 | 32 | 33 | 27 | 34 | 21 | 56 |
| 5. Orange | 5 | 955,865 | 31 | 65 | 18 | 15 | 14 | 15 |
| 6. Pinellas | 6 | 933,994 | 35 | 29 | 11 | 18 | 11 | 86 |
| 7. Duval | 7 | 809,394 | 38 | 58 | 29 | 43 | 13 | 9 |
| 8. Polk | 8 | 502,385 | 25 | 31 | 5 | 11 | 4 | 39 |
| 9. Brevard | 9 | 494,102 | 32 | 21 | 16 | 12 | 13 | 15 |
| 10. Lee | 10 | 475,073 | 33 | 55 | 39 | 49 | 30 | 41 |
| **Florida - total** | **n/a** | **16,674,440** | **28** | **38** | **23** | **24** | **15** | **22** |
| **United States[3]** | **n/a** | **290,850,005** | **24** | **48** | **19** | **21** | **5** | **36** |

[1] County population per Official 2002 Governor's Office estimates. U.S. Population per 2003 Census Bureau estimates.

[2] Data represents recycling Countywide, inclusive of residential and commercial programs

[3] Source: United States EPA. Newspapers = total paper; aluminum cans = all aluminum; plastic bottles = all plastic; steel cans = all steel

[9] *The State of Garbage in America*, Biocycle Magazine, April 2006

[10] Waste News, as reported by the U.S. Environmental Protection Agency, 2003

[11] Florida Department of Environmental Protection, 2002

Counties use a wide range of strategies to promote recycling throughout the community. Many counties have enacted local ordinances mandating commercial recycling, though enforcement of such ordinances varies considerably. Like Miami-Dade, some counties enforce commercial recycling requirements solely on a complaint basis, while others are more aggressive; Philadelphia County, for instance, requires businesses to file a recycling plan and fines violators.

Counties frequently offer public education programs to encourage recycling. These can include educational web sites and radio, television and newspaper ads; San Bernardino County, California even advertises through movie slides at local cinemas. Youth programs, including teacher workshops, school presentations, and youth "scout" programs, are common, as are composting workshops for adults and free or discounted composting bins and mulch.

Counties reach out to the commercial and nonprofit sectors through recycling awards and "green business" certification programs, or by offering free waste audits.

**Spotlight: King County, MI**

King County, Michigan promotes recycling with a broad range of initiatives including an interactive "What do I do with..." web site, industrial and household materials exchange programs, biosolids program, technical assistance to property managers, online discounts for compost bins, Master Recycler and Master Composter educational programs, and "Waste Free Holidays" discount gift certificate program.

Where resources are available, some counties administer community grant programs. It should also be noted that many states offer recycling grants. Finally, a number of counties coordinate industrial and residential materials exchange programs. In a typical program, such as Los Angeles County's LaCoMAX, the county government administers a web site that enables users to browse listings of available and wanted materials; actual exchanges are coordinated by the two parties.

In Miami-Dade County, the DSWM's community-wide recycling promotion efforts are presently limited to complaint enforcement and educational information provided on the departmental web site. Additionally, the Department of Environmental Resources Management (DERM) helps businesses create a customized waste profile through its online interactive tool known as 'reduceyourwaste.org.'

*Residential recycling programs*

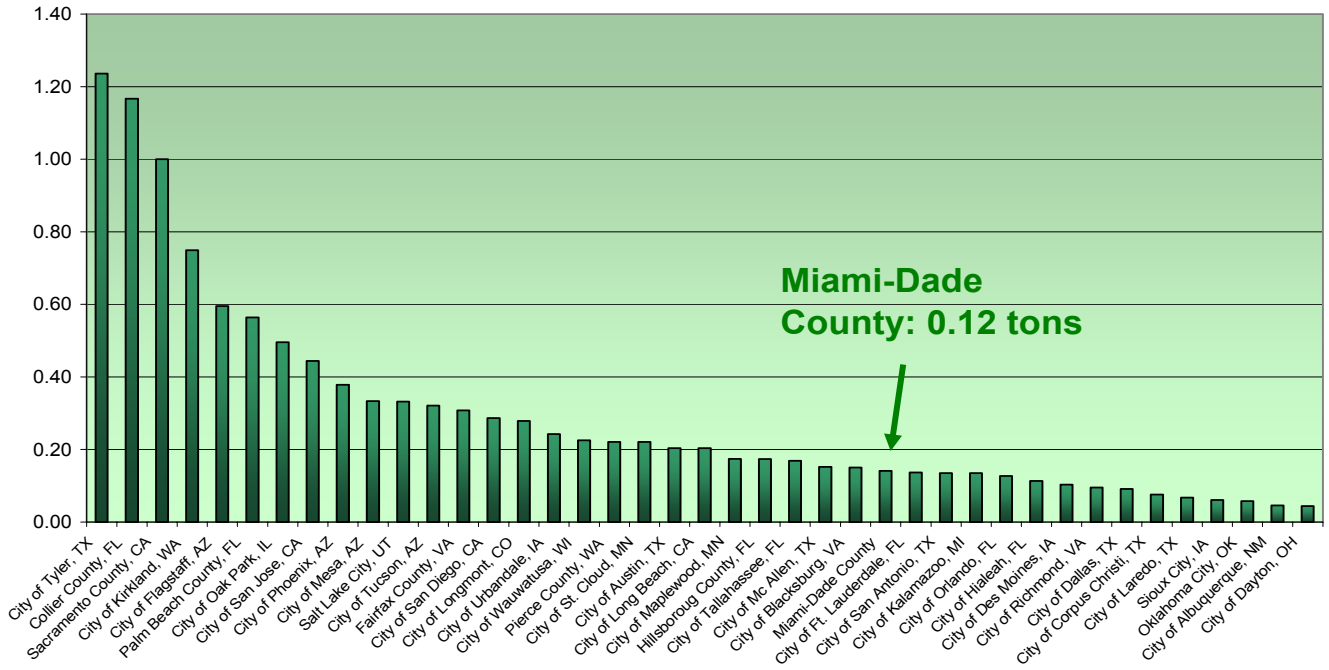
Many, if not most, cities and counties that operate solid waste collection systems directly operate residential recycling programs that provide for the collection, processing and sale of recyclable products. In almost all (33 of 35) of the country's largest cities, this includes regular curbside recycling services. It may also include the operation of drop-off centers and/or the separation of recyclables at waste to energy facilities.

There is no generally accepted definition of a "successful" residential recycling program, and measurement and reporting differences can make it difficult to compare performance.



**Figure 5**: Average Tons of Recyclables Collected Per Household Account*

*Data for the following jurisdictions was compiled by OSBM and corresponds to curbside tonnage only for FY2004-05: Sacramento, Palm Beach, Hillsborough and Pierce Counties and the Cities of Wauwatusa, Ft. Lauderdale, Hialeah, and Albuquerque. All other data was compiled by the ICMA Center for Performance Measurement and corresponds to curbside *and* drop-off center tonnage for FY2003-04.




Most typically, program effectiveness is gauged by quantity measures such as tons collected per household per year.[12] The most productive programs can generate half a ton or more of recyclables per household annually; more typical rates are within the range of one-tenth to one quarter of a ton per household (see Figure 5).

Miami-Dade County currently collects a relatively low .12 tons (240 lbs) per household,[13] despite providing for collection of a wide range of materials. The reasons for this are not clear, though comparative research (details to follow) suggests some possible factors, among them the fact that, largely due to funding constraints, Miami-Dade County's promotional efforts are currently limited to an annual mailing.

Communities use a wide range of methods to collect, process and market recyclable materials. Specific methods are tailored to a jurisdiction's recycling goals and particular circumstances, including the extent of community commitment to recycling, waste disposal capacity, space, size and nature of local collection and processing facilities, local markets for recycled products and availability of funding.

[12] Total tonnage numbers can be misleading, however, as product weights vary widely by material and communities may or may not report yard waste collection.
[13] Inclusive of curbside collection and white goods collected at Trash and Recycling Centers





Collection

There are three basic methods of collecting recyclables from residents: drop-off centers, metals and yard trash separation at waste to energy facilities (performed in Miami-Dade County at the Resources Recovery Facility), and curbside recycling. The three methods are not mutually exclusive; communities with the highest reported recycling rates use more than one.

Drop-off centers:

In many communities, residents can bring recyclable materials to neighborhood drop-off centers at no charge. Drop-off locations are generally operated at the county level, regardless of whether curbside recycling is provided by cities. Acceptable materials vary but typically include newspapers, cardboard, metals, glass, and plastics; used appliances and electronics are also frequently accepted. Some jurisdictions, such as the city of San Francisco, operate a single drop-off center; at the other end of the range are large jurisdictions that operate close to 180 locations, such as Palm Beach County. Available data does not show a clear correlation between number of sites and collections volume. In most cases, volume is significantly lower than what is collected in curbside programs. The City of St. Petersburg, the fourth largest city in Florida, provides recycling services to residents through 17 drop-off locations. The city collects 5,600 tons of recyclables annually in this manner, equivalent to .07 tons per household[14].

**Spotlight: Palm Beach County, FL**

The Solid Waste Authority (SWA) of Palm Beach County achieved a high 36% countywide recycling rate in 2001, and its curbside collection program, which services 160,000 households, is one of the most productive we reviewed, collecting .56 tons per household annually.

The recycling program has an approximate $3 million budget for administrative personnel and advertising efforts, which include television advertising, promotion through homeowner associations and the close monitoring (even following) of recycling truck routes to distribute collection bins. Approximately 180 drop off boxes spread throughout commercial locations such as strip malls, and small business partnerships to purchase recyclables contribute to high collection levels. Through its vendors, the SWA also offers offer curbside services for multi-residential establishments (based on container fees).

Additional efforts to increase the overall recycling rate include mulching and composting operations and a waste-to-energy plant that recovers metals in quantities similar to Miami-Dade County's Resource Recovery Facility.

In Miami-Dade County, used white goods are accepted at neighborhood Trash and Recycling Centers across the County; in 2004, 6,000 tons of recyclables were collected in this manner.

Separation at disposal facilities:

According to a 2002 national survey conducted by the Integrated Waste Services Association, 77% of responding communities with waste to

[14] Based on the number of households (78,000) that receive garbage collection.



energy (WTE) plants recover ferrous metals on site; 43% of the facilities recover other materials such as nonferrous metals, plastics and glass.[15] Combined, these recovery programs accounted for approximately 1.6 million tons of recyclables among responding jurisdictions.[16] According to the survey, in most WTE communities, such recovery programs complement other residential recycling programs: 91% of responding jurisdictions offered recycling drop-off centers and 82% operated curbside recycling programs.[17]

As previously noted, separation activities at Miami-Dade County's Waste-to-Energy (WTE) plant account for 208,000 tons of recyclables.

Curbside Collection:

In a curbside recycling program, residents set out recyclable materials on the curb in front of their homes (or in large bins, in multi-family residences) for regularly scheduled pick-up, usually on a weekly or bi-weekly basis. In most communities, curbside recycling entails a discrete pick-up, separate from garbage collection. Collection for single family residences is usually provided as a government service (although the actual collection may be conducted in-house or contracted out), while multi-family dwelling collection is generally the responsibility of facility management and provided through private contracts.

**Spotlight: San Francisco**

The City of San Francisco provides fully privatized solid waste and recycling collection services to approximately 325,000 single and multi-family households. Collection is performed using trucks that can accommodate the city's 'Fantastic 3' program employing three bins: one for commingled recycling, one for food waste destined for an organic composting program, and one for non-recyclable, non-compostable refuse.

**Spotlight: Wauwatosa, WI**

The city of Wauwatosa, WI uses blue bags to collect recyclables along-with garbage. City-owned trucks are used to collect the bags and deliver them to a city-owned processing facility where all bags are placed on a conveyor belt. Recyclables are manually transferred to separate conveyor belts and dumped into open-topped trucks in preparation for sale.

Communities vary widely in terms of separation requirements. In some cities, all recyclables may be commingled by the resident, to be separated at the processing facility; this is known as *single stream* collection. At the opposite end of the spectrum, some jurisdictions require complete separation of all materials; in Minneapolis, for example, residents are required to separately bundle nine different categories of recyclables for pick-up. In the middle is *dual stream* collection, in which residents separate paper products from commingled containers (glass, plastic and metal). Vehicles must be designed to accommodate the particular collection

[15] Kiser, Jonathan V.L, *Recycling and Waste to Energy: The Ongoing Compatibility Success Story,* MSW Management Magazine, May/June 2003
[16] Ibid.
[17] Ibid.

method; greater source separation requires additional storage compartments in the vehicles and, in some cases, additional staffing requirements. In contrast, a lesser degree of material separation prior to pick-up results in greater collection efficiency, but greater processing challenges at the materials recovery facility.

**Spotlight: Chicago**

The City of Chicago, serving 740,000 residential units, collects recyclables in blue bags at the same time as the garbage. Three separate streams are collected: yard waste, paper products, and commingled glass, plastic, and metal. Residents place all three together with their garbage into a cart that is mechanically dumped into the city-owned and operated truck. The bags are delivered to one of four 'sorting centers' where personnel remove the blue bags from a conveyor-belt system and send them for further processing through three different chutes. The commingled glass, plastic, and metal is then sorted through the use of magnets and hand-sorting.

The program has met with mixed success. In attempt to raise recycling participation rates, Chicago is currently piloting a program utilizing separate collection fleet using bins.

Collection can be provided directly by in-house staff, may be contracted out to one or more private vendors, or may be provided by a blend of in-house and contractor resources. Notably, almost all jurisdictions contacted that contract out recycling collections use the same vendor for garbage pick-up. Well-designed financial incentives for vendors and customers can promote recycling effectiveness. In Seattle, the recycling contractor receives an annual fee adjustment based on total collection volume, as well as bonuses for meeting target set-out rates in multi-family structures. Minneapolis residents can receive a discount of up to $84 annually for recycling, while customers of RecycleBank, a private recycling provider based in Pennsylvania, receive "RecycleBank dollars" based on materials volume that can be exchanged for gift certificates for local retailers like Starbucks and Bed Bath and Beyond.

A small number of communities have experimented with the simultaneous, commingled collection of garbage and recyclables. Frequently referred to as the "blue bag" method, for the colored bags in which recyclables are placed alongside regular garbage bags, this method allows for greater collection efficiency, resulting in lower vehicle and man-hour requirements. (Collection efficiencies are offset to some extent by additional processing demands, however.)

Processing

Commingled recyclable materials must be processed at a materials recovery facility (MRF) prior to sale. MRF technology varies across the country; the newest MRFs possess sophisticated separation mechanisms that minimize the need for manual labor. (As we have seen, processing requirements are closely linked to collection methods.)

Some jurisdictions, including Palm Beach County and Albuquerque, New Mexico, own and operate their own MRFs. More commonly, jurisdictions establish contractual relationships with privately owned and operated MRFs. Contracts can be for processing only, with the



jurisdiction retaining ownership of the materials, or can entail the outright sale of the unprocessed goods.

Sale

After processing, recyclable materials are sold to the marketplace. Sales can be conducted in-house by a marketing manager or through a private contractor; revenues generally help fund recycling program costs. Prices are generally on a 'per ton' basis, and it is important to note that the volume of different materials to comprise one ton varies considerably.

In recent years, markets for recycled materials have enjoyed significant growth, nationally and world-wide. Many of the recyclables collected in the United States are now destined for foreign countries, largely due to the huge demand for secondary raw materials from the world's developing nations, especially those in Asia (most notably China and India). Partly as a result of the robust growth in foreign demand for recyclables, the recycling industry in the United States is very active, and the United States is now one of the largest exporters of recycled material in the world[18].

Historically, markets for recycled products have been volatile, and that volatility continues. According to American Metal Market LLC, for instance, ferrous scrap, one of the most highly prized secondary materials in recent years, sold for $370-a-ton in July, 2006, but may soon be priced in the range of $280-$290 in August. The market for recycled products also varies widely by material and type. Whereas a product like ferrous scrap may see peak times when it sells for hundreds of dollars a ton, less desirable materials, most notably certain types of glass, may rarely (if ever) fetch big dollars. And while one type of plastic may enjoy a robust market, another may enjoy almost no market at all.

An issue of concern for public jurisdictions with recycling programs is that the type of material likely to be collected through a program like curbside recycling can be among the least valuable to the recycling industry. As a rule of thumb, recyclable products that come from the commercial and industrial stream are of a preferable type and better quality than household recyclables, and consequently command more dollars. Given the volatility of the recycling markets, which have even plunged into the negatives in some cases in the past, municipalities have had to pay recyclers to take material off their hands in extreme cases[19].

According to the Bureau of International Recycling estimates, the multi-billion dollar, global recycling industry employs more than 1.5 million people, processes more than 500 million tons of material each year, and invests about $20 billion annually on new equipment and research & development.

[18] According to the Bureau of International Recycling (website)
[19] *Processing and Marketing Recyclables in New York City,* New York City Department of Sanitation/Bureau of Waste Prevention, Reuse, and Recycling, May 2004

**Assessing environmental costs and benefits of curbside recycling**

Comparing the environmental impacts of curbside recycling is a complex proposition. The scientific community uses different methods, including variations of a Life Cycle Analysis (LCA) and environmental cost benefit analyses to compare and contrast the impacts of various factors related to the collection and processing of recycled and raw materials. There is considerable debate among scientists as to the ideal research methodology, though in general, factors commonly considered include:

- **Net energy consumption.** This includes the energy required to produce and process virgin materials; to collect and process recycled materials; and to dispose of non-recycled goods. Energy gains from incineration may also be taken into account.
- **Emissions and other pollution** generated through processing virgin and recycled materials. Emissions resulting from the vehicular collection of recyclables, as well as those emanating from landfills such as (groundwater and methane), are also considered.
- **Preservation or depletion of natural resources.** This includes fossil fuels, minerals, water, forestry, wildlife, and biodiversity.

**In Miami-Dade County:**

- *Approximately 234,000 gallons* of fuel are used per year by the contractor's 51-truck vehicle fleet to complete curbside recycling routes (reported by the vendor).
- Approximately *13 tons* of air pollutants per year are emitted by this fleet, composed of: hydrocarbons, carbon monoxide, and nitrogen oxides. (This is a rough estimate based on EPA's AP-41 table, assuming 2001 or newer vehicles achieving 2.8 miles per gallon. The emissions can vary significantly based on engine type and year.)
- Data regarding *net* increase or reduction of energy consumption or emissions associated with the curbside collection program is not available.

Local governments in particular can be more vulnerable to economic loss due to weak recycling markets than are private sector entities, since their programs yield a steady stream of recyclables regardless of product demand. (It important to note, however, that a jurisdiction's local markets and geographic location are important factors in its marketing success.) In an attempt to insulate themselves from the effects of market swings, some jurisdictions have entered into long term contracts with recyclers that set floor and ceiling prices for commodities and require recyclers to accept the less valuable products along with the more valuable. The boon to the jurisdiction is that exposure is limited when recycling markets are bad; the boon to the recycler is that it gets product at below market price when times are good.

### *Program fees and costs*

In all of the jurisdictions contacted, recycling revenues are insufficient to cover full operating costs (including collection, processing, and administrative overhead) and must be augmented by customer fees or other funding. In the course of this study, jurisdictions

conducting curbside collection frequently subsidized costs with tipping fees from solid waste disposal facilities and/or general fund revenue. In addition, the majority of jurisdictions contacted that have privatized garbage collection use the same contractor to collect recyclables. The recycling fee for these jurisdictions appears to be lower in these instances.

Resident fees for curbside recycling services are frequently blended with other solid waste collection charges; as we have seen, some jurisdictions actually offer discounts or other financial incentives for recycling. Among the jurisdictions contacted that charge a separate recycling fee, annual household fees ranged from $16 to $32.

Although customer *fee* information is easily accessible, residential recycling program *costs* can be difficult to isolate, particularly when services are provided in-house and/or subsidized by other revenue sources. Of the jurisdictions contacted, total net program costs[20] for curbside collection programs ranged from $16-33 per household annually. The International City/County Management Association's Center for Performance Measurement also tracks recycling program costs; for 2004 ICMA reported that net operations and maintenance costs for large (over 100,000 population) jurisdictions averaged $15 per household or $98 per ton[21]; however, a wide range of service delivery models are represented within the sample, making direct cost comparisons difficult. A 1999 Florida Department of Environmental Protection (FDEP) survey of local curbside collection programs statewide found a median reported per household cost of $26.16 annually[22]; at that time, DSWM's reported annual cost was $27.96 per household.

**Spotlight: Palm Beach County**

In unincorporated Palm Beach County, nine separate collection areas are serviced by separate contracts awarded to three different vendors (the total area geographic area served is approximately 1500 square miles). The fee per resident varies according to the specific service area, ranging from $15 to $26. As previously noted, extensive promotional efforts contribute to a large curbside collection volume, and the use of a full time, in-house marketing manager further contributes to strong revenue levels. The County's residential MRF generated $8.2 million in sales FY 05, sufficient to cover facility operating costs. Including collection, processing, revenue and overhead, the cost per ton of recycled materials is $148.18.

Drop-off centers are generally less expensive to operate than curbside recycling programs, which entail considerable fleet, fuel and labor costs. However, drop-off centers tend to yield lower volume, and the available data does not clearly indicate that drop-off centers are more efficient than curbside on a cost per ton basis.

Despite the challenges in direct cost comparison, it can be concluded that Miami-Dade County's curbside recycling program net costs per household (approximately $32) are

[20] Net of revenues from sale of recyclables
[21] ICMA Center for Performance Measurement, 2005
[22] However, the data included a number of apparent errors and some variation in cost and fees components.

above average, while costs per ton ($263) are at the high end of the range nationally. This conclusion - and the fact that Miami-Dade's overall recycling rate is below both national and state averages – call for a broader, more aggressive approach to achieving its recycling goals. The approach would include looking at developing programs that would increase commercial recycling (possibly in conjunction with more proactive enforcement), maximize the use of yard waste, and explore residential recycling alternatives to boost recycling participation through open discussions with industry.



# ATTACHMENT 1
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## Comparative Jurisdictional Interviews

*Municipalities within Miami-Dade County*

- City of Hialeah, FL – Ray Zamora, Acting Superintendent, Department of Solid Waste on June 15, 2006
- City of Miami Springs, FL – Ms. Ally Cox, Administrative Assistant to Robert Williams, Public Works Director on July 19, 2006
- City of Miami Beach, FL – Tamika Clear, Sanitation Coordinator, Public Works/Sanitation Division on July 25, 2006

*Municipalities Statewide*

- Broward County, FL – Phil Bresee, Recycling Program Manager and Richard Meyers, Waste-to-Energy Plant Manager on June 1, 2006
- City of Plantation, FL – Elizabeth Bryant on July 11, 2006
- City of Ft. Lauderdale, FL – Ms. Casey Eckels, Recycling Program Manager on July 21, 2006
- Palm Beach County, FL – Ms. Susan Chapman, Recycling Program Coordinator on June 1, 2006 and John Archambo, Director of Recycling, Customer Service, and Media Arts on June 14, 2006 and Dan Pallowitz, SWA Business Analyst on June 15, 2006
- Hillsborough County, FL – Gretchen Fulmer, Recycling Coordinator on June 29, 2006
- Pinellas County, FL – Andrew Fairbanks, Waste Reduction Program

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*Municipalities Nationwide*

- City of Chicago, IL – Chris Suave, Program Director for Recycling on June 20, 2006
- City of Wauwatosa, WI– Bill Tarman-Ramcheck, Public Works Programs Analyst, on July 13, 2006.
- Sacramento County, CA – Doug Kebold, Solid Waste Planner on June, 20, 2006
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*Additional Jursidictions*

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- Broward County, FL
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## Legislation

- 2005 Florida Statutes Title XXIX: Public Health, 403.706, Florida Administrative Code
- Chapter 15 Solid Waste Management
- Administrative Order 4-68: Schedule of All Service Levels and Fees for the Miami-Dade County Department of Solid Waste Management

## Additional Documents

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